

**IN THE ABSTRACT**

A method for producing DME, which comprises separating a CO<sub>2</sub> rich stream from a crude product stream containing DME and CO<sub>2</sub> obtained by a DME synthesis from a feed syn gas; introducing the CO<sub>2</sub> rich stream to a reverse water gas shift (RWGS) reactor wherein it is reacted with hydrogen in the presence of an oxide catalyst of either ZnO or NiO to provide a CO rich stream, and recycling the CO rich stream to the step of the methanol synthesis step.